3.23 TRANSPORTATION

This section describes the baseline conditions of the EIS Analysis Area transportation resources that may be impacted by the proposed mine, transportation facilities, and pipeline. The EIS Analysis Area for evaluation includes Dutch Harbor (Unalaska), the Kuskokwim River, and the natural gas pipeline corridor from the mine site to Cook Inlet. Discussion of transportation modes and infrastructure that extend beyond the proposed Project Area is included to give context to the affected environment. Transportation services and access are limited in the largely undeveloped proposed Project Area, so the transportation needs of the proposed could not be met with existing transportation modes and infrastructure.

This section also describes potential impacts to transportation resources within the proposed Project Area resulting from the proposed mine, transportation facilities, and pipeline. Impacts are defined as effects on existing transportation, and focus particularly on whether new activities would cause congestion, exceed existing capacities, or displace existing transportation activities. As a matter of definition, new project-dedicated vessels or transportation infrastructure, such as the proposed new purpose-built river barges, new facilities at Bethel and Angyaruaq (Jungjuk) and a new airstrip at the mine site add new dedicated transportation capacities, rather than putting the whole project transportation burden on existing infrastructure or displacing current users. The transportation analysis for the Environmental Consequences section covers the construction, operations and maintenance, and closure, reclamation, and monitoring phases of the Donlin Gold Project, and is limited to the transportation modes and infrastructure that are important to the existing transportation system in the EIS Analysis Area.

SYNOPSIS

This section looks at the proposed project's effects on regional transportation systems within the EIS Analysis Area. The focus is on the potential for the proposed Donlin Gold Project activities to strain existing infrastructure or displace existing transportation uses. New project-dedicated transportation infrastructure, like port improvements in Bethel, reduces the potential to displace existing uses. Transportation resources within the proposed mine site are limited to the few trails that cross the site, and permanent alteration of these access easements and closure of the mine site to public access for the life of the mine would be the primary impacts. For the transportation facilities and pipeline components, impacts to surface, air, and water transportation resources are evaluated. Of these, the greatest impacts would be to existing water transportation on the Kuskokwim River.

Summary of Existing Conditions:

Surface: Surface transportation in the proposed Project Area ranges from the developed local network of roads near the eastern terminus of the proposed pipeline to the remote areas with few roads in the majority of the Project Area. In most of the proposed pipeline right-of-way, as well as in the area of the proposed mine site, villages are not connected by road; out-of-village, land-based travel is restricted to foot, all-terrain-vehicle, and snowmachine use.

Air: Air transportation is the primary year-round mode of transportation in the EIS Analysis Area. In addition to the large Anchorage airport, regional air transportation hubs are found in Bethel and Aniak, and all villages have airports. Mail and important goods are delivered by air; travel within, as well as to and from, the area takes place by air; and air travel is of primary importance for medical care.

Water: Water transportation is important throughout the proposed Project Area during the open water period of the summer. The Port of Anchorage is a major cargo hub for the state, especially the rail belt, while the Port of Bethel is the principal cargo hub for the Yukon-Kuskokwim Delta. The Kuskokwim River is the transportation corridor that would be most affected by the proposed project. Existing barge traffic on the river supplies communities with fuel and goods, while small boat river travel supports the critical subsistence activities of fishing, hunting, gathering, and sharing, as well as inter-community family and social travel.

Expected Effects:

Alternative 1: No Action – This alternative would not affect transportation in the area. No changes are expected, beyond those that have already resulted from the exploration and baseline studies work.

Alternative 2: Donlin Gold's Proposed Action

Mine Site: With few and primitive trails existing and no water access, the proposed mine site would have little effect on transportation resources.

Transportation Facilities: Surface: The proposed Bethel cargo terminal and Dutch Harbor fuel storage would create slight increases in road traffic. *Air:* Frequent Donlin-sponsored flights to the dedicated airstrip near the mine site would move large numbers of personnel and supplies, without routing through regional hubs. The project could increase general demand for commercial air traffic in the region, but existing service could expand to meet this need. *Water:* The greatest effects to water transportation from Alternative 2 would be associated with barging on the Kuskokwim River. Barges may disturb but not prevent small boat travel. New port facilities in Bethel would expand capacities to accommodate the volume of the Donlin Gold Project, without displacing other uses. Overall, impacts from the transportation facilities component are seen as moderate.

Pipeline: Surface: Impacts from the proposed pipeline would be limited by remoteness and by controlled access to the right-of-way in the vicinity of Beluga. Impacts to the Iditarod National Historic Trail are discussed in Section 3.16, Recreation Resources and in Section 3.17, Visual Resources. *Air:* Pipeline construction would require nine temporary airstrips that would be reclaimed when construction was complete. Three public airports along the pipeline route would also see increased use. Air traffic related to the pipeline component would be greatest during construction, with intermittent monitoring flights throughout operations. Impacts from other users of the clear pipeline right-of-way are detailed in Section 3.16, Recreation, and Section 3.21, Subsistence. *Water*: The proposed pipeline would create slight increases in

regional shipping during construction and, to a lesser extent, closure and reclamation, but with little potential to displace other uses. Overall, the effect of the pipeline component on Transportation Resources is seen to be minor due to the low intensity of the impacts.

Other Alternatives: The effects of Alternative 5 on transportation resources would be similar to those of Alternative 2. Differences of note for other action alternatives include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would reduce diesel fuel needs by two-thirds, resulting in a reduction in total annual river barging by 32 percent, (from 122 round trips reduced to 83), and reducing the disturbance to other transportation users.
- *Alternative 3B (Diesel Pipeline)* would eliminate diesel storage at Dutch Harbor, Bethel Fuel Terminal, and the proposed Angyaruaq (Jungjuk) Port, as well as all of the diesel fuel barging. Total annual barging would be reduced by 48 percent, (from 122 round trips reduced to 64), further reducing disturbance to other transportation users. Three additional Donlin Gold airstrips have been proposed for pipeline construction, with most of the airstrips left in place throughout the operating life of the pipeline for necessary diesel spill response capacity.
- *Alternative 4 (Birch Tree Crossing [BTC] Port)* would reduce the distance traveled by barge by 75 river miles or 38 percent. This would eliminate barging effects on three communities: Aniak, Chuathbaluk, and Napaimute. The 76-mile mine access road would be 153 percent longer than under Alternative 2 (from 30 to 76 miles).
- *Alternative 6A (Dalzell Gorge Route)* would entail the creation of temporary airstrips at Pass Creek and Tatina, not needed under Alternative 2. These would be reclaimed after the construction phase.

3.23.1 AFFECTED ENVIRONMENT: LOCAL AND REGIONAL TRANSPORTATION SYSTEMS

The local and regional transportation infrastructure in the EIS Analysis Area includes ports, barge landings, airports, local roads, and trails. The Kuskokwim River region is served by commercial air service from Anchorage to Aniak and Bethel. Generally, the EIS Analysis Area lacks a developed regional road system; those roads that do exist are found in the immediate vicinity of villages (ADOT&PF 2002). The Kuskokwim River serves as the primary transportation corridor during most of the year. Only very general data are available for air, marine, and surface traffic since the information is either not recorded, or it is proprietary. The EIS Analysis Area is geographically divided by the Alaska Range into the Kuskokwim River basin and the Cook Inlet basin. The Kuskokwim River basin extends from Kuskokwim Bay up the Kuskokwim River to Rainy Pass and would host the mine site, the transportation facilities, and the western portion of the pipeline. The Cook Inlet basin would host the eastern segment of the proposed pipeline right-of-way (ROW) extending from Beluga north and west to Rainy Pass. The following description of transportation systems is organized by mode (i.e., surface, air, water) with subsections on the project components.

3.23.1.1 SURFACE TRANSPORTATION

3.23.1.1.1 MINE SITE

In the area immediately surrounding the proposed mine site, a few primitive trails crisscross or traverse the proposed mine site. Most of these trails, which were built to support placer mining operations in the past, are not currently usable by wheeled vehicles (ARCADIS 2013a). A historically used trail runs through the area, and placer mines have been operating along Crooked Creek and its tributaries since 1909. During the winter season, snowmachines or dog teams can use these trails to access the proposed Project Area. Winter land access to the site from the south (Crooked Creek Village on the Kuskokwim River) is infrequent, and there is no marked trail.

3.23.1.1.2 TRANSPORTATION FACILITIES

Existing surface transportation modes within the Kuskokwim River basin include various overland transportation means that vary by season and location. In addition to active trails, there are easements that represent historic use, as with R.S. 2477 easements, or serve to protect future access, such as section line easements and 17(b) easements. Many of these easements see very little contemporary use due to the remote location and limited population within the region. Additional information on easement use can be found in Section 3.15, Lands, and Section 3.16, Recreation. For a history of roads and trails in the Crooked Creek vicinity, see Brown 1985. More detailed discussion of R.S. 2477, section line, and 17(b) easements is found in Section 3.15, Land Ownership, Management, and Use.

Development of transportation modes within the region is hindered by a relatively small population (less than one person per square mile), remote geographical location, relatively long distances between towns and villages, a small cash economy and limited tourism, a high density of wetlands and water bodies, poor soils (fine-grained organic), presence of permafrost, scarcity of aggregates for construction, harsh winter climate and short ice-free season, and construction restrictions in federally protected areas (such as the Yukon Delta National Wildlife Refuge)(ARCADIS 2013a).

During the winter, the frozen Kuskokwim River serves as a transportation corridor for snowmachines, off-highway vehicles, dogsleds, and light-duty passenger vehicles (cars and pickup trucks). The ice road supports large trucks for a month on average each winter when ice thickness is sufficient. Heavy equipment and trucks up to 25,000 pounds (not including cargo) are able to use the ice road. During the shoulder seasons of freeze-up and breakup, there typically are no motorized vehicles or boats on the river. Ice roads built on the Kuskokwim River can extend from Bethel downstream to Eek and upstream to Aniak, although in many years the cleared roads are less extensive due to ice conditions. There are approximately 28 miles of ice road on and along the Kuskokwim River in winter, which the City of Bethel occasionally pays to have plowed (City of Bethel 2011). Using the Kuskokwim River for winter travel by snowmachines (or less frequently dog teams) between Aniak and Crooked Creek is common, but travelers must be vigilant about dangerous conditions of thin ice and open water created by riffles, currents and changing temperatures. An extensive system of marked winter trails runs between villages, which allows for local travel by snowmachine (or less frequently dogsleds).

On the lower river, nearer to the City of Bethel, hovercrafts provide summer and winter postal, freight, and passenger service to eight nearby communities, operating over open water, marshy land, and river ice. Hovercrafts are used year-round in the area between Napaskiak and Akiak on the lower Kuskokwim River, with the exception of short times during freeze-up and breakup periods.

Surface travel during the summer months is largely dominated by watercraft. Throughout most of the Kuskokwim River region, it is nearly impossible to travel on land between villages due to the lack of roads. There are some short roads that connect villages in close proximity to each other, but these are limited. Travel within villages is generally confined to the gravel road systems, 4-wheeler trails, or boardwalks.

3.23.1.1.3 PIPELINE

The only organized communities in the proposed pipeline corridor are Tyonek and Beluga. No all-season roads connect the communities to the state's highway system; access is primarily by airplane. The Alaska Native Village of Tyonek is located on a bluff on the northwest shore of Cook Inlet, 43 miles southwest of Anchorage. It has an airport and a network of gravel roads maintained jointly by the Tyonek Native Corporation and oil and gas companies who have facilities in the area. The largest network of roads leads from logging areas west of Tyonek to the dock and former chip mill operation at the North Forelands Landing Facility.

The community of Beluga is located 8 miles north of Tyonek, along Cook Inlet, 40 air miles southwest of Anchorage. Beluga is connected to Tyonek by road with a bridge over the Chuitna River. Gravel roads exist throughout the immediate surrounding area of Beluga, providing access to private homes, gas production facilities, the Chugach Electric Association power plant, the Beluga Airport, and the Beluga gravel barge landing (Ladd Landing). These roads are serviced by oil and gas companies with facilities in the area. The Beluga road network connects to roads on Tyonek Native Corporation lands south the Chuitna River and to Cook Inlet Region, Inc. and State of Alaska lands to the north and west. A road along Chuitna River provides residents access to subsistence use areas. Ice roads occasionally cross the Susitna River and connect Beluga to the Matanuska-Susitna Borough road system during winter months (KPB 2003).

No all-season land access to the proposed pipeline corridor exists. The main surface transportation network is comprised of trails. The proposed pipeline corridor receives low levels of regular winter use from Anchorage, the Matanuska-Susitna Borough and local area residents

Surface travel along the proposed pipeline corridor north of Beluga and along the proposed pipeline corridor generally is limited to snowmachines and dogsleds during winter months. On-road vehicles and wheeled off-road vehicles are used on well-traveled roads and trails within communities during the summer and on frozen rivers and lakes during the winter. Snowmachines and dogsleds utilize the countless trails that crisscross the region surrounding the proposed pipeline route, including the Iditarod National Historic Trail. The Iditarod National Historic Trail is suitable for mechanized use only in the winter.

The Susitna-Tyonek Trail (RST 200) is approximately 46 miles long originating at the historic townsite of Susitna; it follows the Susitna River south then heads southwest along marshlands at the base of Mount Susitna. The trail crosses the Theodore River and the Beluga River then

follows the shoreline of Cook Inlet, crossing the Chuitna River and Beluga River, terminating at the community of Tyonek. Parts of this trail are known as Beluga Road, connecting the barge landing area to the Chugach Electric power plant and Beluga Airport.

Oilwell Road is the closest public road to the proposed pipeline corridor and could be a potential location for a terminus for an ice road to support construction of the proposed pipeline. Oilwell Road is a gravel road located 60 miles northwest of Anchorage and 25 miles northeast of Skwentna. Oilwell Road is accessed from mile 5 of the Petersville Road, just west of the Parks Highway at Trapper Creek. The Willow Landing Route is an additional primary winter access corridor, which like the Oilwell Road Route has previously been used as a commercial/industrial winter trail. Each primary route would include several spur options or secondary routes to provide access to the pipeline corridor. The Pretty Creek Road is another example of an existing public road to the proposed pipeline corridor. Table 2.3-16 (Chapter 2, Alternatives) provides information on Winter Access Routes within the Susitna Valley, and Table 2.3-20 (Chapter 2, Alternatives) provides descriptions and identification of access roads.

3.23.1.2 AIR TRANSPORTATION

3.23.1.2.1 MINE SITE

The existing exploration camp airstrip is a 5,000-foot long privately owned gravel runway capable of handling aircraft as large as a C-130 Hercules (SRK 2012a). This runway is closed to the public, except in emergencies. All equipment, supplies, and personnel are transported by chartered aircraft from Aniak and Anchorage because at present there is no overland access to the exploration site.

Small propeller-driven aircraft provide local air service for passengers, freight, and mail between Aniak and Crooked Creek. Crooked Creek Airport is a publicly owned (ADOT&PF 2011), public use community class airport located within the community of Crooked Creek, 10 miles south of the mine site on the Kuskokwim River. The airport has one gravel runway 2000 feet long by 60 feet wide. Passenger boardings (enplanements) totaled 362 in 2012 (FAA 2013), air taxi operations were 1,436, and general aviation operations were 120, for total operations of 1,556 in 2002. Forecast operations for 2012 were 1,951 total operations (FAA 2013).

Airborne transportation to the mine site would rely on air traffic out of specific locations, as discussed in Section 3.23.1.2.2, Transportation Facilities, below.

3.23.1.2.2 TRANSPORTATION FACILITIES

Airspace along the Kuskokwim River is used by commercial and general aviation aircraft. Aircraft are the only four-season transportation mode in the Kuskokwim River area. Air transportation hubs in the region include the airports at Bethel and Aniak, which have runways longer than 5,000 feet.

Bethel serves as the larger regional air transport hub, providing regularly scheduled connections to 26 of the region's villages. The airport also serves as the distribution point for over 20 million pounds of mail and air cargo per year (ADOT&PF 2002).The Bethel Airport is the third busiest airport in the state. The main Bethel airport has two paved parallel runways, Runway 01L/19R is 6,400 feet long and 150 feet wide and runway 01R/19L is 4,000 feet long

and 75 feet wide. The airport also has a gravel cross-wind runway that is 1,850 feet long and 75 feet wide. The airport has 232 based aircraft (FAA 2013) and 122,000 operations, of those 65,857 are air taxi operations and 49,578 are general aviation operations. The route between Bethel and Anchorage is served by both jet and propeller craft. There is daily jet service between Bethel and Anchorage for passengers and cargo. Many small air taxi services operate from Bethel, serving 56 villages in the surrounding areas with scheduled and charter service. The Bethel Airport had 148,168 passenger enplanements in calendar year 2012 (FAA 2013).

Aniak is the next largest community along the Kuskokwim River, and also operates as an air service hub. Aniak Airport receives regular commercial turboprop service from Anchorage and serves as the mail distribution hub for a collection of 10 villages along the Kuskokwim River, including most of the villages near the proposed Project Area. The Aniak Airport had 15,220 passenger boardings (enplanements) in calendar year 2012 (FAA 2013).

The Ted Stevens Anchorage International Airport is the largest airport in Alaska located 277 air miles east of the mine site. The airport had over two million passenger enplanements in calendar year 2012 (FAA 2013) and is the second largest cargo airport (landed weight) in the U.S. reporting more than 16.5 billion pounds of cargo in calendar year 2012 (FAA 2013).

Other communities in the area have runways of 3,000 feet or less that accommodate small passenger and cargo planes (ADOT&PF 2002). Float planes are common throughout western Alaska during the summer, offering greater flexibility than wheeled planes because they can operate from rivers, lakes, and from Kuskokwim Bay. There is a float plane base in Bethel. Most light aircraft operate between Bethel and surrounding communities. Light aircraft equipped with skis operate between many of the communities during the winter.

State-owned and maintained runways available within the upper Kuskokwim basin include airports in Red Devil, Sleetmute, Stony River, McGrath, and Nikolai. In addition, private airstrips are located along the length of the western segment of the pipeline route.

3.23.1.2.3 PIPELINE

Three publicly-owned, public use airports are located within the pipeline Project Area, including Skwentna Airport, Rainy Pass Lodge Airport, and Farewell Airport (Table 3.23-1). The Skwentna Airport (airport code SKW) is located on the bank of the Skwentna River near the confluence with the Yentna River and is owned and operated by the Alaska Department of Transportation and Public Facilities (ADOT&PF). The airport serves mostly small aircraft that deliver passengers and supplies to the roadhouse and cabins in the area. It has a 3,400-foot long by 75-foot wide gravel runway with three based single-engine aircraft and 3,500 annual operations (FAA 2013).

Rainy Pass Lodge Airport (6AK, also referred to as Puntilla Airport) is a publicly-owned (by ADNR), public use airport comprised of a dirt surface runway that is 2,100 feet long by 25 feet wide. The airport is located approximately 125 miles northwest of Anchorage, adjacent to Puntilla Lake in Rainy Pass of the Alaska Range, near the Rainy Pass Lodge. Rainy Pass Lodge Airport reported 235 annual operations comprised of 50 air taxi operations, 25 general aviation local operations, and 160 general aviation itinerant operations (FAA 2013).

Table 3.23-1: Summarizes the Airports Located in the Pipeline Project Area

Airport	Owner	Use	Annual Operations	Runway Length	Runway Surface	Runway Lighting	Based Aircraft	Services
Skwentna (SKW)	ADOT&PF	Public	3,500	3,400	Gravel	MIRL	0	Cargo, Fuel
Rainy Pass Lodge (6AK)	ADNR	Public	244	2,100	Dirt	None	0	None
Tyonek (TYE)	Village of Tyonek	Private	2,605	3,000	Gravel	LIRL	3	
Beluga (BLG)	Conoco Phillips Alaska	Private	5,564	5,002	Gravel	MIRL	0	None
Beluga Heliport (5AK1)	Chugach Electric Association	Private	Unknown	40 x 40	Gravel	None	1	Unknown
Farewell (FWL)	FAA	Public	Unknown	4,600	Gravel	None	Unknown	None
Nikolai Creek (9AK3)	DNR-MLW	Private	Unknown	4,100	Gravel	None	Unknown	None

Source: FAA 2013b.

The Farewell Airport (airport code FWL) is a public use, public airport owned by the U.S. Department of Transportation (FAA) located in Farewell, Alaska about 10 miles west of the South Fork Kuskokwim River. The 4,600-foot long by 30-foot wide gravel surface runway (08/26) is unattended and operations data is unavailable (FAA 2013).

Privately-owned, private use airstrips east of the Alaska Range are located in Beluga, Tyonek, Nikolai Creek and many of the lodges in the Susitna River basin area. Seasonally maintained or unmaintained airstrips are located along the proposed pipeline corridor. There is no scheduled air service to any airstrip within the eastern pipeline corridor, although charter services from Anchorage and Matanuska-Susitna Borough airports are widely available (MSB 2008).

Beluga Airport (airport code BLG) is a private use airport owned by Conoco Phillips Alaska located 8 miles northeast of Tyonek. Prior permission is required to land. The airport is attended and has two gravel surface runways: 01/19 which is 5,000 feet long by 100 feet wide, and 09/27 which is 2,500 feet long by 60 feet wide. Annual operations total 5,600 and include 500 air taxi, 100 local general aviation, and 5,000 itinerant general aviation operations. The Tyonek Airport (airport code TYE) has a 3,000-foot long by 90-foot wide gravel runway that is owned by the Village of Tyonek and is connected by a local road to nearby Beluga. Operations data is unavailable. Nikolai Creek Airport (airport code 9AK3) is a 4,100-foot long by 75-foot wide gravel runway located near Granite Point on the west side of Cook Inlet 10 miles southwest of Tyonek. The airport is privately operated; however, it is located on state land and therefore classified as public ROW (FAA 2013).

Other privately owned and operated airports in the vicinity of the eastern pipeline corridor include: Talaheim Airport (airport code 1AK8) located 25 miles south of Skwentna and has a dirt runway that is 950 feet long by 35 feet wide; Talachulitna River Airport (airport code 1AK6) is located 10 miles south of Skwentna and has a 1,800-foot long by 50-foot wide gravel runway; River John Airport (airport code 3AK9) is 6 miles east of Skwentna with a 1,850-foot long by 50-foot wide gravel runway. Kiska Metals has constructed a runway at their Whistler camp located approximately 8 miles southeast of the Rainy Pass Lodge airport along the Skwentna River (KMC 2013).

Float planes are common throughout Alaska during the summer, offering greater flexibility than wheeled planes because they can operate from rivers, lakes, and bays. Float plane bases are located in Anchorage, the Matanuska-Susitna Borough, and in Bethel. Light aircraft equipped with skis operate from many of these same locales during the winter. Float and ski planes provide transport of passengers and light cargo for recreational activity in the area.

3.23.1.3 WATER TRANSPORTATION

3.23.1.3.1 MINE SITE

Waterborne transportation to the mine site would rely on the Kuskokwim River, as discussed in Section 3.23.1.3.2, Transportation Facilities, below.

3.23.1.3.2 TRANSPORTATION FACILITIES

The principal transportation artery is the Kuskokwim River, an important and defining feature of the region, supporting local and commercial vessel traffic and commercial and subsistence fishing. The Kuskokwim River heads at the confluence of its East and North Forks and then flows southwest 500 miles to empty into Kuskokwim Bay (RWJ 2010a). The lower portion of the Kuskokwim River, from the village of Aniak south to Kuskokwim Bay, is contained within the boundaries of the Yukon Delta National Wildlife Refuge.

The main channel width of the lower Kuskokwim River between the Bering Sea and Napakiak ranges from 2 to 4 miles. The channel narrows considerably above the village of Napakiak where it is typically 0.4 to 0.7 mile wide between Napakiak and Kalskag. Above Kalskag to Stony River, the river channel is typically 0.5 mile or less in width but can expand to as much as one mile when side channels and/or bends in the river occur (RWJ 2010a). At the site of the proposed Angyaruaq (Jungjuk) Port, the river narrows to a width of approximately 0.25 mile or between 1,300 and 1,500 feet.

The depth of the river varies along its length; oceangoing barges can navigate upriver to Bethel and barges with drafts of up to eight feet can navigate as far upriver as Crooked Creek. The lower Kuskokwim River is characterized by one major channel with several smaller branches and is subject to tidal fluctuations that occur as far upstream as Akiachak (AGRA 1998). Project-related activities would be confined to the navigable waters of the Kuskokwim River and Kuskokwim Bay.

There are relatively few docks, ramps, or mooring facilities along the Kuskokwim River. Landing facilities at villages are usually unimproved riverbanks. River shoals are constantly changing, and there are few navigational aids or charts for many parts of the river. The section of the Kuskokwim River from Crooked Creek to Bethel currently handles medium size barge

tows (40 by 160 feet with a draft of 6-8 feet) (ADOT&PF 2002). Based on interviews with Kuskokwim River barge operators conducted in November and December of 2013, approximately 68 freight and fuel barge tows per year serve the villages upriver of Bethel (Ausdahl 2013; Clevenger 2013; Faulkner 2013; Jansen and Stauffer 2014; Leary 2013; Myers 2013;). The typical barge tow is one barge pushed by one tug; however, Crowley Marine operates two and four fuel barge tows in a side by side configuration. Heavy barge traffic upriver of Bethel is not unprecedented. In the late 1970s and 1980s, widespread infrastructure construction, financed by the increase in state revenues from oil production on the North Slope, occurred in the Kuskokwim River region that increased barge traffic (BGC 2007c).

The Kuskokwim River supports a large volume of commercial barge, personal boat, and subsistence and commercial fishing traffic during the short ice-free summer season. Activity is concentrated on the lower river near Bethel and to a lesser extent around upriver villages (the activity around these upriver villages is less due to their smaller populations.). Commercial salmon fisheries, typically using drift nets, are concentrated in the lower reaches of the main stem of the Kuskokwim River. Both the main stem of the Kuskokwim River and its tributaries are used by local subsistence users for fishing and for fish camps. Set nets, subsistence drift net fishing, rod and reel fishing, dip netting, fish camps, and fish wheels are used along the Kuskokwim River and tributaries throughout the year, with concentrated effort during the salmon runs of the summer. In addition, hunting for moose, bear, caribou, marine mammals, and waterfowl, and gathering berries and firewood are often associated with travel by boat to access these resources (see Section 3.21, Subsistence). Guided fishing trips are also provided commercially for non-local fishermen on some Kuskokwim River tributaries (see Section 3.16, Recreation).

Ocean barges can access the mouth of the Kuskokwim River once shore-fast ice clears the main navigation channels, usually around late May. During the last ten years, this date has been as early as May 1st and as late as early June. River barges may begin to move upstream of Bethel once the river is free of ice, generally between late April and June 1st. The Kuskokwim River typically begins to freeze up in early October, which abruptly ends the shipping season. Shipping seasons vary from year to year depending on the timing of ice break-up and freezing, and the available draft in the river. In addition, for the stretch of river between Bethel and Jungjuk, historical data on ice conditions and break-up indicate that river barges are usually able to move upstream of Bethel between April 24 and June 1, and that the river begins to freeze up again in early October.

According to the U.S. Coast Pilot (NOAA 2013b), a seasonally maintained, basic buoy system marks the run through Kuskokwim Bay and up the river to Bethel. There are no shoreside or extended season markers for small boat navigation. No seasonal buoys mark the channel from Bethel to the proposed port sites. In the late fall, river depths at the Oscarville crossing, about six miles downriver from Bethel, can be as shallow as 14 feet.

The following partial excerpts (numbered sections in italics) from the United States Coast Pilot 9 (NOAA 2013b) describe the difficulty in navigating the Kuskokwim Bay and Kuskokwim River.

> *(290) The channels through the bay are not always apparent by the surface indications of the water. At times the channels will be smooth with rips on the shoals, and at other times the reverse will be true. The edges of the channels are often marked by long lines of foam, but occasionally the foam extends across the channels; it is well to approach these lines with caution. Navigation is recommended only at low water, when the mudflats are visible, enabling the channels between them to be followed. Because of the inequality of the tides, a vessel grounding at high water may not be refloated for several days.*

> *(291) The 40-mile approach through Eek Channel to Kuskokwim River is a maze of shifting sandbars, both visible and covered, and blind channels. The channels in the bay and river undergo constant change from year to year, because of the action of the sea, currents, and ice; extreme caution and continuous soundings are necessary.*
>
> *(292) The procedure usually followed is for a small pilot boat from Goodnews Bay to precede the vessel through these waters, constantly feeling out the channels and sounding.*
>
> *(293) During S(south) storms a heavy sea makes up the bay nearly to Eek Island, at the head of the bay, and vessels caught on a shoal are in danger of breaking up.*
>
> *(294) The channel through Kuskokwim Bay and up Kuskokwim River to Bethel is marked by seasonal buoys. The markers above Kuskokwim River Buoy 12 are oil drums that are set to mark the best water. The deepest draft that should attempt to reach Bethel is about 15 feet.*
>
> *(295) Caution: In 1983, the Coast Guard reported that as a result of flooding in the area, about 20 ocean shipping containers were washed into the Kuskokwim River from the riverbank at the village of Napaskiak, about 12 miles SW of Bethel. Reports indicate that several of the containers sank in the river near the village, and the remainder of the containers were carried downriver and sank. Mariners are advised to exercise caution in navigating Kuskokwim Bay and River.*

The Port of Bethel is the receiving, storing, and transshipment center for petroleum products and barged freight for Yukon-Kuskokwim Delta communities. It serves communities upriver on the Kuskokwim, downriver on the Kuskokwim, along the western coast of Alaska and along the Lower Yukon River. The Kuskokwim area commercial salmon industry also relies on the port for most of its infrastructure and processing requirements. Fuel, supplies, and other cargoes loaded onto ocean-going barges in Seattle and elsewhere are delivered to Bethel, 78 river miles up from the mouth of the river where it empties into the Bering Sea. From Bethel, smaller river barges deliver supplies farther upstream. The shipping season is restricted to the ice-free period from approximately the beginning of June through the end of September each year.

Port of Bethel facilities include the small boat harbor, Brown's Slough, float plane area, beach #2 and public access areas (mainly used by recreational and subsistence users), the cargo dock, petroleum dock and seawall (mainly used by commercial users). The Port of Bethel cargo dock is a nine-acre facility utilized for off-loading, storing, and distributing cargo destined for Bethel and transshipment to other communities in western and northern Alaska. Because the Yukon-Kuskokwim Delta is not connected to any other community by road or rail, the Bethel general cargo dock and staging area are critical to the shipment of freight to the Delta. (City of Bethel 2011) The cargo dock is used for offloading and loading sand, gravel, and freight and is capable of handling and storing hazardous materials (City of Bethel 2011).

The petroleum dock is used for loading and unloading bulk petroleum. The seawall is used for moorage of tugs, boats, and barges. Beach #1 is adjacent to the cargo dock and is used for landing craft and barges with ramps, giving those vessels roll-on/roll-off capabilities. In the winter time, this area is used to store boats and barges. In the spring, this area is used for shipyard work to get those boats and barges ready for the upcoming season. This is the only area in the region for these activities. Beach #1 has no room for expansion and is now at its limit for these activities. (City of Bethel 2011), Bethel's port facility can dock ships up to 400 feet long at the primary freight dock and two small river barges along the Brown's Slough side of the port. The Petro Port can berth a 380-foot barge, and accommodates about 12 mainline fuel barges each year (City of Bethel 2011).

The shipping route to Bethel requires navigation within a channel marked by buoys deployed each year by the U.S. Coast Guard. The channel accommodates vessels with a maximum draft of 12 feet. Once vessels arrive in Bethel, loads are then offloaded/reloaded to vessels with

maximum drafts of 6 feet to 7 feet for barging upriver. Crowley Marine currently has a barge/tug transfer operation for large barges at Helmick Point (50 river miles downstream of Bethel) on the lower Kuskokwim River. This is an alternative barge transfer site where cargo from ocean going barges is transferred to smaller barges for deliveries upriver. Transit times from Helmick Point to Crooked Creek vary based on a number of variables, including the number of stops, river level, commercial fish openings, and the number of barges being pushed by the tug. A non-stop chartered shipment from Helmick Point would take 86.5 hours to reach Crooked Creek. A more typical multi-stop run takes about five to six days to reach Crooked Creek (RWJ 2010a).

The U.S. Coast Guard's Marine Casualty and Pollution Data files provide details about marine casualty and pollution incidents investigated by Coast Guard Offices throughout the U.S. The database allows analysis of accidents and incidents by a variety of factors including vessel or facility type, injuries, fatalities, pollutant details, location, and date. Additionally the Coast Guard Maritime Information Exchange (CGMIX) website has an online searchable database containing data and summary reports for investigations of reportable marine casualties (Incident Investigation Reports [IIR]) undertaken by the U.S. Coast Guard from November 2002 to present. A vessel casualty must be reported to the U.S. Coast Guard if it occurs upon the navigable waters of the U.S., within territories or possessions of the U.S., or whenever and wherever a casualty involves a U.S. vessel. Public vessels and recreational vessels are exempt from these reporting requirements (46 CFR 4.01-3). Casualties include: groundings; loss of main propulsion; primary steering or reduction in maneuverability; occurrences that reduce seaworthiness (fire, flooding, damage to or loss of fire extinguishing, lifesaving or bilge pumping systems); loss of life; injuries requiring professional medical treatment; vessel damage exceeding $25,000; and spills of oil and hazardous material. Typically, accidents, fatalities, injuries and other casualties are reported on Coast Guard standard form CG-2692 and entered into the Marine Information for Safety and Law Enforcement (MISLE).

A search for Kuskokwim in the IIR database resulted in nine investigation reports that were included in the MISLE database results and are shown in Table 3.23-2. An additional incident occurred June 4, 2015, where a barge was grounded near Kuskokwim Bay carrying an estimated 68,000 gallons of fuel. The Coast Guard found no damage to the tanks or hull, and identified no pollution resulting from the incident (Alaska Dispatch News 2015b).

Table 3.23-2: Incident Investigation Reports for Kuskokwim River and Kuskokwim Bay

Vessel Type	Location	Type	Resolution	Date
Fishing Vessel	Kuskokwim River near Bethel	Grounding; Oil Discharge	Spill cleanup and mitigation	Aug. 24, 2002
Tug	Kuskokwim River near Stacy's Crossing	Grounding	Pilot boat freed the tug	Jun. 25, 2005
Tug	Kuskokwim River	Grounding	Tug freed itself	Jun. 25, 2005
Tug and Barge	Kuskokwim River	Grounding	Tug freed itself and barge	Oct. 1, 2005
Barge	Kuskokwim River near Oscar Crossing	Grounding	Fuel was lightered off barge until it was refloated	Sept. 23, 2006
Fishing Vessel	Kuskokwim Bay	Personnel Casualty	Crewmember died from an onboard accident	Jun. 3, 2007

Table 3.23-2: Incident Investigation Reports for Kuskokwim River and Kuskokwim Bay

Vessel Type	Location	Type	Resolution	Date
Barge	Kuskokwim River at Aniak	Grounding; Fuel Discharge	Spill cleanup and mitigation	Jun. 12, 2007
Tug	Kuskokwim River	Collision	Damage to vessel	Sept. 11, 2007
Tug	Kuskokwim River near buoy 18	Grounding	Tug freed itself	Aug. 20, 2009

Source: USCG 2014.

The Port of Bethel's small boat harbor, Brown's Slough, Float Plane Area, and beach #2 are mainly used by recreation and subsistence users. The total annual berth-days at these facilities between 2005 and 2009 averaged 102 days. The cargo dock, petroleum dock and seawall are mainly used by commercial users and total annual berth-days at these facilities averaged 132.5 days per year between 2005 and 2009 (City of Bethel 2011). During the same period, wharf tonnage averaged 25,334 tons per year, while the Petro Port received an average of 17 million gallons per year. About 20 percent of the fuel is delivered to villages served from Bethel each year.

The Port of Bethel had an average of 113.8 trips inbound and outbound by self-propelled vessels between 2007 and 2011 (NOAA 2013b) (Table 3.23-3). The highest numbers of trips were 142 in 2007 and the lowest numbers of trips were 73 in 2011. In 2006, the Port of Bethel reported 87,000 tons of commodities landed (Corps 2006b) of which 77,000 tons were gasoline and distillate fuel oil. Additionally, in 2006 Bethel had 224 total trips of vessels with drafts of 18 feet and less, 116 inbound and 108 outbound. Inbound trips were comprised of 53 self-propelled tow or tug vessels and 63 non-self-propelled vessels (40 dry cargo vessels and 23 tanker vessels). Outbound trips were comprised of one self-propelled dry cargo vessel and self-propelled 51 tow /tug vessel, 38 non self-propelled dry cargo vessels and 18 non self-propelled tankers.

Table 3.23-3: Bethel Harbor, Commercial Vessel Trips, 2007-2011

	Self-Propelled Tow or Tug Vessels	Non Self-Propelled Dry Cargo Vessels	Non Self-Propelled Tanker Vessels	Total
2011 Inbound	37	44	17	98
2011 Outbound	36	43	15	94
2011 Total	73	87	32	192
2010 Total	105	98	33	231
2009 Total	144	128	20	293
2008 Total	99	98	36	231
2007 Total	142	136	16	298

Source: Corps 2013.

Data on commercial vessel traffic on the Kuskokwim River is collected by the Corps' Navigation Data Center, Waterborne Commerce Statistics Center. Data collected includes number of trips by vessel type, direction (upbound and downbound), vessel draft, and year. A

trip is a vessel movement and for self-propelled vessels, a trip is logged between every point of departure and every point of arrival. For loaded barges, a trip is logged from the point of the loading of the barge to the point of unloading of the barge. For empty barges, trips are logged from point of unloading to the point of loading.

Waterborne traffic movements are reported to the Corps by all vessel operators of record. The reports are generally submitted on the basis of individual vessel movements completed. For cargo movements, the point of loading and unloading of each individual commodity must be delineated. Domestic commerce excludes cargo carried on ferries, coal and petroleum products loaded from shore facilities directly into bunkers of vessels for fuel, insignificant amounts of government materials, and fish. A summary of data on movement of vessels at Bethel Harbor and on the Kuskokwim River is provided in Table 3.23-3 and Table 3.23-4, respectively. Trips include self-propelled dry cargo, tanker and towboat vessels and non-self-propelled dry cargo and liquid tanker barge vessels.

Between calendar years 2007 and 2011 an average of 405 commercial vessel trips per year were logged on the Kuskokwim River and of those, 187 trips were self-propelled vessels (Table 3.23-5). Approximately 88 percent of the total trips were made by vessels with drafts of nine feet or less and 66 percent with drafts five feet or less. During that same period, an average of 249 total commercial vessel trips per year were logged at Bethel Harbor and of those, 114 trips were self-propelled vessels (Corps 2013).

Table 3.23-4: 2011 Kuskokwim River Commercial Vessel Trips, 2011

	Self-Propelled Tow or Tug Vessels	Non Self-Propelled Dry Cargo Vessels	Non Self-Propelled Tanker Vessels	Total
Inbound	97	113	20	230
Outbound	102	119	24	245
2011 Total	199	232	44	475
2010	151	123	56	330
2009	249	226	24	499
2008	148	138	41	327
2007	191	187	18	396

Source: Corps 2013.

Table 3.23-5: Kuskokwim River Commercial Vessel Traffic, CY2007-2011

Vessel Type	CY2011	CY2010	CY 2009	CY2008	CY2007
Self-propelled Dry Cargo	0	0	1	1	4
Self-propelled Tanker	0	0	0	0	0
Self-propelled Towboat	199	151	248	147	187
Non self-propelled Dry Cargo	232	123	226	138	187
Non self-propelled Tanker Liquid Barge	44	56	24	41	18
Total:	475	330	499	327	396

Source: Corps 2013.

River use is not evenly distributed either geographically or temporally; areas of concentrated activity can be found around communities and during fishery openings (RWJ 2010a). There is a particular concentration in the Bethel area between Napakiak and Akiachak, which is the most densely populated area along the river.

Little area-specific river traffic information is available for non-commercial vessels as data on non-commercial (personal and fishing) vessel traffic on the Kuskokwim River is not collected. The Alaska Department of Administration, Division of Motor Vehicles requires registration of all powered boats used on any water within the state. Data on registered boats in Bethel is available for the years 2001 through 2012; 701 boats were registered in 2012 (DMV 2013). Data on boats registered in other communities along the Kuskokwim River are lumped into an "Other Alaska" dataset so the number of boats registered in specific communities is unavailable.

In order to estimate volume and location of non-commercial vessel traffic on the Kuskokwim River, boat counts from fish and wildlife surveys were reviewed. Fishing activity and wildlife observation surveys conducted on the Kuskokwim River in the summer and fall of 2009 (RWJ 2010b) counted boats fishing and not fishing. The surveyed sections of the river included the reach from Georgetown (upstream of Crooked Creek) to Eek Island (mouth of the Kuskokwim), from Bethel to a point 10 miles downstream of Fowler Island (ADF&G Kuskokwim District Statistical Area 335-12), and between Helmick Point and the village of Tuntutuliak. As shown in Table 3.23-6, 2,569 boats were observed within the full reach between Georgetown and Eek Island, while 1,744 boats were observed on the stretch between Bethel and Fowler (Table 3.23-7), and 180 boats observed between Helmick Point and Tuntutuliak (Table 3.23-8). A review of the datapoints on boats observed fishing and not fishing from the activity survey indicated that approximately 421 boats were observed between Bethel and Georgetown over all observation dates in 2009. From these data, it is assumed that approximately 16 percent of non-commercial vessel traffic could be attributed to the river section from Georgetown to Bethel and 84 percent to the section downriver from Bethel.

Table 3.23-6: Summary of Boats on the Kuskokwim River from Georgetown to Eek Island during 10 Fishing Activity Surveys Conducted in Summer and Fall 2009

Fishing Activity Dates	Location (River Reach) from Downriver to Upriver	Number of Boats Fishing	Number of Boats Not Fishing	Number of Boats Not Fishing (at Villages)	Total Number of Boats Observed
5/28/2009	Bethel to Georgetown	0	24	120	144
6/10/2009 - 6/11/2009	N. Eek Island to Georgetown	54	76	143	273
6/23/2009 & 6/26/2009	N. Eek Island to Georgetown	120	84	142	346
7/11/2009	N. Eek Island to Bethel	11	27	72	110
7/15/2009 - 7/16/2009	N. Eek Island to Crooked Creek	1	82	169	252
7/22/2009 - 7/23/2009	N. Eek Island to Crooked Creek	1	109	145	255

Table 3.23-6: Summary of Boats on the Kuskokwim River from Georgetown to Eek Island during 10 Fishing Activity Surveys Conducted in Summer and Fall 2009

Fishing Activity Dates	Location (River Reach) from Downriver to Upriver	Number of Boats Fishing	Number of Boats Not Fishing	Number of Boats Not Fishing (at Villages)	Total Number of Boats Observed
8/4/2009 & 8/12/2009	N. Eek Island to Georgetown	5	122	183	310
8/18/2009 & 8/21/2009	N. Eek Island to Georgetown	72	71	179	322
9/4/2009 & 9/10/2009	N. Eek Island to Georgetown	3	109	207	319
9/17/2009 - 9/18/2009	N. Eek Island to Crooked Creek	0	62	176	238
	Totals	267	766	1,536	2,569

Source: RWJ 2010a.

Table 3.23-7: Count of Boats on the Lower Kuskokwim River in ADFG Kuskokwim District Statistical Area 335-12 Summarized by Month from May 20, 2009 through September 29, 2009 between Bethel and Fowler Island

Date	Number of Boats Not Fishing	Number of Boats Fishing	Total Number of Boats
May	29	3	32
June	291	433	724
July	265	191	456
August	181	240	421
September	122	0	122
Total 2009	888	867	1755
Total 2008[1]	839	898	1737
Total 2007[1]	685	998	1683
Total 2006[1]	771	432	1203

Notes:

1 Jewett et al, 2007a, b; 2008a, b, c; 2009a, b.

Source: RWJ 2010b.

Table 3.23-8: Number of Boats on the Lower Kuskokwim River between Helmick Point and Tuntutuliak Summarized by Month from June 3, 2009 through September 24, 2009

Date	Number of Boats Not Fishing	Number of Boats Fishing	Total Number of Boats
June	42	31	73
July	18	14	32
August	29	29	58
September	17	0	17
Total 2009	106	74	180
Total 2008[1]	114	193	307
Total 2007[1]	112	105	217

Notes:

1 Jewett et al, 2008a, b, c; 2009a, b.

Source: RWJ 2010a.

Dutch Harbor

The Unalaska Department of Ports and Harbors manages, maintains and operates six City owned marine facilities at Dutch Harbor: the U.S. Coast Guard (USCG) Dock; the Unalaska Marine Center Dock; the Light Cargo Dock; the Robert Storrs International Small Boat Harbor; and the Carl E. Moses Boat Harbor. The Unalaska Marine Center Dock and USCG Dock consist of approximately 2,051 linear feet of dock face. The Unalaska Marine Center Dock offers cargo, passenger, and other port services. Horizon Lines operates a 30-ton crane and rail system for containerized cargo and North Pacific Fuel operates fueling facilities. Depth at mean lower low water (MLLW) alongside the berthing area is 40 feet. North Pacific Fuel's facilities include four marine fueling facilities. Offshore Systems, Inc. offers marine terminal services near the head of Captain's Bay in Dutch Harbor. Offshore Systems, Inc. provides 1,500 linear feet of dock space and around-the-clock stevedoring services. Unalaska Island marine traffic included 1,423 total domestic trips in 2009 (Northern Economics 2009).

3.23.1.3.3 PIPELINE

Rivers in Susitna watershed are shallow braided streams. Travel by water on the Susitna River and its tributaries is limited to small river boats due to the shallow channels. Freight delivery by barge on the Susitna River is not feasible.

Most of the bulk freight and heavy equipment used by residents and industry on the west side of Cook Inlet arrives by barge from the Port of Anchorage and is off-loaded at one of four barge-landing areas: Ladd Landing, Tyonek Landing, Granite Point Landing, and the Drift River Terminal (KPB 2003).

The Ladd Landing is located north of the mouth of the Chuitna River, between Tyonek and Beluga. This facility provides an off-loading point for equipment and supplies for the Chugach Electric power plant, natural gas fields, coal and mineral exploration activities and the domestic

needs of the families living in the Beluga area. The tidelands belong to the State of Alaska, while the uplands belong to the Kenai Peninsula Borough. The village of Tyonek also has a barge-landing beach, located within the community, which is used for off-loading local equipment, fuel, and freight (KPB 2003).

A third barge-landing beach on the west side of Cook Inlet is located one mile west of Granite Point, between Shirleyville and the Granite Point Pump Station. This facility is privately-owned and used to support the oil and gas activities, fishing, mining, tourism, and recreational use (KPB 2003).

Farther south, at the mouth of Drift River on Redoubt Bay and directly west of Kenai, there is a fourth barge-landing area. This is associated with the major oil tanker moorage at the Drift River Marine Terminal. The Drift River Terminal, consisting of two breasting dolphins and two mooring dolphins, can accommodate tankers up to 830 feet long. The facility, owned by Cook Inlet Pipeline Company, is exclusively for petroleum products and can only off-load ballast water and load crude oil through submerged pipelines that lead to tanks on shore. The oil is from wells in Cook Inlet that feed a pipeline that takes oil south paralleling the shore to the terminal area. This facility has undergone extensive construction to resolve flooding and safety problems resulting from the 1989-1990 eruption of Mt. Redoubt, and berms were raised and reinforced in response to the 2009 lahars.

The North Foreland Landing Facility, owned and operated by Tyonek Native Corporation, is located on the northwestern shore of Cook Inlet near North Foreland, approximately 45 miles west of Anchorage and 1.5 miles southwest of the village of Tyonek. The wharf is approximately 1,500 feet long (KPB 2003).

The Port of Anchorage (POA) is the major point of entry for containerized cargo in Alaska. Approximately 240,000 containers move through the port annually (POA 2013a). The port provides an estimated 90 percent of the merchandise goods for 85 percent of Alaska's populated area which includes over 200 village and rural towns across Alaska. The Port of Anchorage is also an important hub for fuel, providing 1.4 million gallons of fuel to western Alaska for heating oil, gasoline, and diesel (POA 2013a). It is also an important source of gasoline for the Anchorage and southcentral area. The POA is the only intermodal deep-water port in Alaska, fully operational year round, and located only a few miles from one of the busiest cargo airports in the U.S. POA facilities include four ship berths and a published draft depth of -35 feet below MLLS which accommodates ships requiring 30 feet of draft (POA 2013a). There are three general cargo terminals and two petroleum product terminals.

Port MacKenzie on the west side of Knik Arm near Anchorage is a deep draft dock facility that is connected to the south central Alaska road system. The port would be connected by rail to the Alaska Railroad mainline when construction of the new rail spur is complete, currently planned for 2017. The port can handle large ocean-going ships and has a barge offloading facility.

3.23.1.4 CLIMATE CHANGE

Substantial arctic warming has occurred since the mid-20th century as reported in several studies (USGCRP 2014; IPCC 2013; Hinzman et al. 2013). In the Kuskokwim River area, there are anecdotal observations of early breakup, thin river ice, and open water in winter, which may be related to climate change. Climate change has been attributed to changes in ice roads and transportation on the frozen Kuskokwim River, reducing the window of time for safe

winter travel. Snowmachine travel during winter has also been impacted by increased temperatures, with slushy conditions or a lack of snow cover observed in recent years. Section 3.26, Climate Change, describes current observations and trends.

Local observations of permafrost conditions in the Kuskokwim River area also note increased permafrost degradation along traditional use trails associated with the mild winter of early 2014 (ANTHC 2015). Local surface transportation systems and airstrips have been affected by climate change to the extent that climate change induced or accelerated riverine erosion and subsidence have damaged trails, roads, and runways.

3.23.2 ENVIRONMENTAL CONSEQUENCES

This section presents that analysis of potential impacts from the proposed action and alternatives. Increased transportation activity associated with the proposed project is evaluated in terms of the likelihood to strain the existing regional transportation infrastructure and/or displace existing transportation activities. Potential impacts to transportation resources were determined by assessing the magnitude (intensity), duration, geographic extent, and context of anticipated impacts using specific impact criteria. The impact criteria used to assess each indicator are described in Table 3.23-9 below.

Table 3.23-9: Transportation Impact Criteria

Type of Effect	Impact Component	Effects Summary		
Effects on Transportation	Magnitude or Intensity	**Low**: Disturbance or displacement of transportation access, mode, or traffic levels may not be measurable or apparent.	**Medium**: Noticeable disturbance of displacement of transportation access, mode, or traffic levels.	**High**: Acute or obvious displacement of transportation access, mode, or traffic levels.
	Duration	**Temporary**: Changes last during the construction period.	**Long-term**: Changes in last through the life of the project.	**Permanent**: Changes persist after project closure.
	Geographic Extent	**Local**: Effects realized by communities within a subregion, such as the Upper Kuskokwim or Central Kuskokwim.	**Regional**: Effects realized by communities throughout the EIS Analysis Area.	**Extended**: Effects extend beyond the EIS Analysis Area.
	Context	**Common**: Affects transportation having alternate routes, facilities, or modes of transport.	**Important**: Affects transportation with limited comparable alternate routes, facilities, or modes. Transport route or facility may be protected by legislation.	**Unique**: Affects transportation without comparable alternate routes or modes. Transport route or facility designated by legislation for transportation.

3.23.2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action Alternative, the project would not be undertaken and the required permits would not be issued. There would be no mine site development, no transportation facilities, and no natural gas pipeline. Consequently, there would be no impacts, neither adverse nor beneficial, to transportation resources from implementation of the No Action Alternative. Alternative 1 would have no effect on climate change as related to transportation resources in the EIS Analysis Area.

3.23.2.2 ALTERNATIVE 2 – DONLIN GOLD'S PROPOSED ACTION

3.23.2.2.1 MINE SITE

Under Alternative 2, construction and operations at the mine site would remove or prohibit use of approximately 9 miles of primitive trails that occur within the mine site area as well as the historically used trail, such as R.S. 2477, which passes through or near the mine site. Use of these trails would cease as the mine site would be closed to public access for safety considerations. A list of R.S. 2477 ROWs is available in Table 3.15-1 and a list of 17(b) easements is available in Table 3.15-2, in Section 3.15.2.1, Land Ownership, Management, and Use. Since the trails and routes in the area currently do not support wheeled vehicles and are only occasionally used by snowmachines and dog teams, potential direct and indirect effects associated with prohibiting use or removing these trails would likely affect a very small number of users. Direct and indirect impacts to 17(b), R.S. 2477 ROW, and state public access easements are discussed in more detail in Section 3.15, Land Ownership, Management, and Use. Trails affected by the mine site, in relation to transportation use, are common in context and local in extent as their removal would not greatly alter existing surface transportation or extend beyond the mine site. These impacts would be of low intensity (a few intermittent users of many trails in the area affected) and permanent in duration since the trails would not be replaced during the closure phase. There is no opportunity for water transportation near the mine site, and therefore direct and indirect effects to water transportation as a result of the proposed project would not occur.

3.23.2.2.2 TRANSPORTATION FACILITIES

<u>Surface Transportation</u>

A new access road would traverse varied terrain from the mine site to the Angyaruaq (Jungjuk) Port site near the mouth of Jungjuk Creek. Direct and indirect impacts to surface transportation from the construction and operations of the proposed road from the mine site to the Angyaruaq (Jungjuk) Port site would be limited due to the remote character of the region. Traffic on the road would be limited to vehicles associated with the Donlin Gold Project (2,917 annual trips made by tractor-trailers), during the barging season and would not be open to the public or The Kuskokwim Corporation (TKC) shareholders during the operational life of the mine. At mine closure, the access road would remain in place and be maintained to provide access to the Project Area for perpetual monitoring and operation of the water treatment facility. After closure, the road could potentially be used by TKC shareholders. However, the road would not pass near existing settlements or communities, nor would it connect with the existing road

system (see Figure 2.3-12 in Chapter 2, Alternatives); therefore, use of the road is expected to be limited. As a result, the activities of the proposed Donlin Gold Project would not intersect or otherwise impact the limited surface transportation infrastructure connecting or within the villages on the Kuskokwim River or in the Kuskokwim River basin. Due to the control of access and the lack of connection to existing roads or ROWs, there would be no effect to existing surface transportation and winter routes from construction, operations, or mine closure of the road from Angyaruaq (Jungjuk) Port to the mine site.

Construction of the cargo terminal and additional fuel storage in Bethel would likely cause a slight increase in the number of vehicles traveling over roads in Bethel. As outlined in Section 3.23.1.1, Surface Transportation, surface traffic levels in the community of Bethel are relatively low, and construction vehicle travel would result in only a slight increase in daily traffic in the community. This slight increase in traffic would be of low intensity (traffic level increases would not be measurable), temporary (only during the construction phase), and would be easily accommodated by the existing road network. Local traffic patterns would not be altered. During the operations and maintenance phase of the Bethel cargo terminal and fuel storage area, low levels of additional traffic are estimated, and would result in a limited effect on local traffic patterns and use in Bethel. Donlin Gold would provide employee transportation; employee transportation is not estimated to affect local traffic patterns in Bethel.

Under Alternative 2, additional fuel storage would be needed in Dutch Harbor. Currently, no detailed plans have been developed for infrastructure in Dutch Harbor, however there is requisite physical infrastructure and land available for storage and effects can be analyzed based on knowledge of prior projects. If construction of additional fuel storage were to occur at Dutch Harbor, minimal traffic would be added to local roads. The additional traffic from trips by construction workers and suppliers to the two ports would be of low intensity and would not noticeably alter local traffic patterns.

The construction and maintenance of surface transportation facilities would be a low intensity impact on local transportation in Bethel and Dutch Harbor because of the small number of additional trips that would be generated for surface transportation. The duration of direct and indirect impacts to surface transportation would be long-term because the use and maintenance of port facilities and fuel tanks would last the life of the mine. The extent of the impacts would be local, as surface transportation effects would be limited to the communities of Bethel and Dutch Harbor. The transportation modes and infrastructure in the communities are widely available with alternative routes available, so impacts would be common in context.

Air Transportation

During the construction and operations phases of Alternative 2, workers, time-sensitive supplies, and equipment would be transported by plane to an airstrip at the mine site. Donlin Gold proposes to operate the airstrip for private, unscheduled use, chartered aircraft for flights from regional airport hubs (Bethel, Fairbanks, and Anchorage) to the mine site airstrip. Under normal operations, the airstrip would not be open to the public. In the event of an emergency, the airstrip could be used by planes not associated with the Donlin Gold Project. The proposed flights would increase local aviation operations to and from regional airport hubs, but would not create a new destination and access point for non-project related air traffic within the region. As a result, increases in regional airport hub air traffic would be limited to the regional hubs where the additional air traffic would represent a small increase relative to existing levels.

The estimated number of air operations (by aircraft type) that would occur during mine site construction and operation at the mine site are listed in Table 3.23-10. Estimates for closure have not been developed, but a high estimate could assume levels similar to estimates for construction. Actual levels would likely be less than levels for the construction phase.

Under Alternative 2, local air traffic would increase by 5,148 annual operations during the 3-year construction period and 1,716 annual operations during mine operation and maintenance. Regionally, these additional operations would be distributed between Ted Stevens Anchorage International (271,168 existing annual operations), Fairbanks International (119,898 existing annual operations), and Bethel (122,000 existing annual operations) airports (FAA 2013). For these airports, the proposed annual operations for the Donlin Gold Project would represent less than 5 percent of the total operations.

Table 3.23-10: Estimates of Annual Operations[1] at Mine Airstrip

Phase	Rotary Wing Aircraft	Fixed Wing Aircraft			
		Dash 8 Q300	Twin Otter Series 400	Cargo Plane (TBD)	Total Annual Operations
Construction	TBD (local use in area of mine site development)	2,808 (27 flights per week: 3 passenger flights per day, 6 cargo flights per week)	2,184 (3 flights per day)	156 (3 flights per 2 weeks)	5,148
Operations and Maintenance	TBD (casual use)	936 (9 flights per week: 1 passenger flight per day, 2 cargo flights per week)	728 (1 flight per day)	52 (1 flight per 2 weeks)	1,716

Notes:

1 Operations are equal to the number of arrivals and departures

Source: Fernandez 2013e.

Alternative 2 could spur increased demands for commercial air service from contractors, suppliers, and local businesses involved directly or indirectly with operation of the mine. If demand on the existing air transportation infrastructure in the region was sustained, private sector air carriers would likely increase the number of flights accordingly, therefore minimizing long-term impacts to air transportation. Additional demand has the potential to increase traffic load at regional airports; however, impacts are expected to be limited given each airport is serviced by air traffic control towers.

Closure and reclamation activities would have a minimal impact on local and regional aviation operations as the number and frequency of flights into the mine airstrip related to reclamation activities would be small due to the decreased activity levels at the mine site. After reclamation activities are complete, aviation operations would consist of an occasional flight for post-closure monitoring spread throughout the year.

The anticipated combined effects on air transportation in Alaska from project-related air traffic during construction, operations, and closure of the proposed project would be low in intensity, with less than a 5 percent increase to annual operations at the Bethel, Fairbanks, and Anchorage airports. The effects would last during construction and operations, would decrease during

reclamation and closure, and would be considered long-term impacts. The extent of impacts would be regional given that air travel would be affected at the mine site, Bethel, Fairbanks, and Anchorage, and would concern a mode of transportation that is common in the area with capacity for additional demand. The construction, operations and closure of transportation facilities would be anticipated to have no effect on local commercial service (scheduled) operations and would be limited to private charter air traffic.

Water Transportation

Kuskokwim River

During the summer months, the Kuskokwim River is traveled by small vessels engaged in commercial and subsistence fishing, transportation activities, as well as large vessels such as tugs and barges used to supply river communities upriver from Bethel. The majority of the small vessel traffic on the Kuskokwim River consists of high-speed river boats that tend to travel closer to the river bank compared to the larger, slower tug and barge combinations proposed under Alternative 2 for cargo transport. As a result, the proposed barge traffic would result in limited direct displacement of existing smaller boat traffic along the proposed barge travel routes. There is, however, the potential for increased safety risk to small boats from barge waves, something local residents have expressed concern about. This could impair existing travel patterns by delaying or displacing small boat traffic from preferred routing. For the Donlin Gold Project, a 110-day shipping season from June 1 to October 1 is assumed (SRK 2013a), which includes periods with smaller load volumes or without barging due to low flows in the Kuskokwim River. An overview of barge traffic annual volume is shown in Table 3.23-11.

Table 3.23-11: Estimated Number of River Barge Round Trips per Season

	Carrying	From	To	Annual Barge Trips
Estimated current use	Cargo/Fuel	Bethel	Upriver communities	68
Construction (3-4 years)	Cargo	Bethel	Angyaruaq (Jungjuk) Port Site or BTC	50[1]
	Fuel	Bethel	Angyaruaq (Jungjuk) Port Site or BTC	19[2]
	Pipeline Materials	Bethel	Staging area near Devil's Elbow, above Stony River (2 years)	20
Operations (27+ years)	Cargo	Bethel	Angyaruaq (Jungjuk) Port Site or BTC	64
	Fuel	Bethel	Angyaruaq (Jungjuk) Port Site or BTC	58

Notes:

1 Total would be 200 trips over four years. Exact distribution would be determined during final design.
2 Average; actual number would range from 9 to 29 annually.

Alternative 2 would increase commercial vessel traffic on the Kuskokwim River during the construction phase as cargo and fuel are transported to the proposed Angyaruaq (Jungjuk) Port. Over the 4-year construction period, it is estimated that approximately 200 river barge round trips, or 50 per year, would be required to move cargo from Bethel to Angyaruaq (Jungjuk) Port. During construction a smaller number of fuel barges, would be required, estimated at an average of 15 annual round trips, transporting an average of 10 million gallons each year during

the 4-year construction period. Together these would represent approximately 65 barge tows round trips per year, or about 54 percent of the volume of barge traffic as during the operations phase of about 122 barge round trips per year (Enos 2013d). In comparison, it has been estimated that approximately 68 barge tows per year (round trips per season) currently occur annually to serve the villages upriver of Bethel (Ausdahl 2013; Clevenger 2013; Faulkner 2013; Jansen et al. 2014; Leary 2013; Myers 2013). The existing barge trips are typically tows of one or two barges, whereas the Donlin Gold Project barge traffic would be tows of four barges. The increase in summer shipping season barge traffic during the construction phase would represent an addition of 96 percent of baseline (65 round trips compared to 68 in the baseline). Together, the new level of barge activity would represent 196 percent of baseline (133 compared to 68) The additional barge traffic during construction would represent a large increase in river traffic relative to the existing levels of use on the river, but would be low overall and distributed along 199 miles of the Kuskokwim River (Bethel to proposed Angyaruaq [Jungjuk] Port).

During the operations and maintenance phase, the proposed Donlin Gold Project would require approximately 122 cargo and fuel barge tows (round trips per season) from Bethel to supply the fuel and consumables needed at the mine. In comparison to the current levels of barge traffic, these trips would represent a large increase in barge traffic along those segments of the river between Bethel and the Angyaruaq (Jungjuk) Port facility. The new barging, or the incremental increase, represents a 180 percent increase over baseline (122 round trips compared to the 68 round trip baseline). Adding baseline trips to new barging trips together generates a total barge traffic that is 280 percent of baseline (122 new round trips added to the 68 round trip baseline is equal to 290 total round trips which is 280 percent of the 68 baseline round trips).These elevated barge traffic levels could increase congestion and disturbance of the commercial and non-commercial vessel traffic at narrow channel segments along the Kuskokwim River.

The likely magnitude of likely effects to commercial and non-commercial vessel traffic on the Kuskokwim River between Bethel and Angyaruaq (Jungjuk) would be medium because the increase in barge traffic attributable to the proposed project would noticeably affect existing traffic, but would not acutely displace existing transportation activities. The increase in summer shipping season barge traffic during the operations and maintenance phase would represent a 180 percent increase over baseline. Another measure of change in barge frequency would be the average number of barge passings per day, and the average time interval between barge passings. The project-related total of 122 roundtrip barge tows per season would result in 244 barge passings (i.e., one-way transits) during the estimated 110 days shipping season. This would represent 2.2 barge passings per day, and an average interval between barge passings of 10.8 hours. While this would be a large increase in barge traffic relative to baseline river traffic estimates, the additional barge traffic under Alternative 2 would be distributed along 199 river miles of the river and interact on a limited basis with existing small boat use on the river.

At mine closure, the Angyaruaq (Jungjuk) Port facilities (including sheet piling and fill) would be removed and reclaimed, with only a primitive barge landing remaining to support monitoring, and operation of the Water Treatment Plant at the pit lake (after approximately 50-55 years) under Alternative 2. Water transportation would return to near baseline levels as Donlin Gold mine-related barge activity on the Kuskokwim River would decline to very low levels of traffic to support monitoring, thus reducing the potential to impact or displace traffic on the Kuskokwim River between Bethel and the port facility.

These direct effects would be long-term since they would extend through the life of the mine (27.5 years) and would affect communities along the Kuskokwim River from Bethel to Crooked Creek, making impact regional in context. The Kuskokwim River serves as an important transportation system resource for communities along the river, which are not served by roads.

Port of Bethel

The Port of Bethel is the receiving and shipping center for the Yukon-Kuskokwim Delta region, serving 53 communities. Under Alternative 2, the Port of Bethel would receive approximately 10 additional freight barges annually during mine construction over the approximate 15 to 20 freight barges the port currently receives. This would represent approximately a 50 percent increase in the number of annual freight barge receipts at Bethel. Similarly, during the operations phase of the mine an additional 14 mainline fuel barges and 12 cargo barges would dock in Bethel, more than twice the number of barges currently received at the dock annually (City of Bethel 2011). As an indirect effect of this alternative, the improvements to port facilities and the creation of additional cargo and fuel capacity would have a beneficial effect to the existing port facilities.

Anticipated effects of Alternative 2 on the Port of Bethel facilities would be of medium intensity since there would be greater than a 10 percent change in the number of barge receipts, but the potential to displace other uses would be offset by the additional barge, cargo and fuel capacity constructed at the port facilities in Bethel. The effects would continue over the life of the project, and would affect communities throughout the region that rely on cargo shipments from Bethel. Direct impacts to the port would be important in context as they would affect a transportation hub with limited comparable alternative in the region.

Summary of Transportation Facilities Impacts

The direct and indirect effects of the Donlin Gold transportation facilities on existing transportation systems would result in medium intensity impacts, due to noticeable congestion and limited displacement of current uses in narrow reaches of the Kuskokwim River at the Bethel Port facilities during the summer shipping season. The addition of project-related port facilities and dedicated barge vessels reduced the potential strain on existing infrastructure and displacement of current uses. Direct and indirect impact to surface, air, and water transportation would be long-term in duration since impacts would extend through the life of the mine. Overall impacts would be regional in extent given that communities along the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port would be affected. For those communities affected, impacts would be considered important in context as they would affect transportation hubs and the Kuskokwim River, and would occur in an area not served by roads that relies extensively on water and air transportation resources.

3.23.2.2.3 NATURAL GAS PIPELINE

Surface Transportation

Under Alternative 2, public access to the natural gas pipeline ROW by way of surface transportation would be limited over the majority of the pipeline by the remoteness of the route. Construction of the proposed pipeline would temporarily interrupt surface transportation along the first 5 miles of the pipeline (MP 1 to MP 5) where it is co-aligned with existing

transportation ROW, which is used intermittently by local area residents. The proposed transmission line, used to provide power to the pipeline pumping station, would also cross an existing ROW in the vicinity of Beluga. Construction of the proposed transmission line would interrupt access along this public ROW, but this interruption would likely be temporary. Along these segments, and at other locations in the vicinity of Beluga where construction activities would impact existing access routes, alternate access would be provided or controlled access would be allowed. Notice of pipeline construction activity restrictions and information on how the public could coordinate access needs with construction activities would be provided.

During the approximate 3-year pipeline construction period, two winter access corridors (approximately 46 and 50 miles respectively) would be used to transport equipment and supplies to the pipeline ROW proposed under Alternative 2. These winter routes would provide access to the natural gas pipeline ROW from the road system, either from Willow or Petersville Road. Each route has been previously used for commercial oil and gas exploration, but neither is currently being used for these purposes. Since there is little to no existing traffic on those routes (SRK 2013b), no direct or indirect effects on other transportation uses would be expected from Alternative 2 actions on these two winter access corridors.

Existing roads, trails, or other public routes encountered during the construction and operations phases of the natural gas pipeline would be protected and connectivity would be maintained. Measures utilized to maintain surface transportation corridors would include provisions for suitable permanent crossings where the buried pipeline would intersect existing trails. If project construction physically impacts roads, trails, or other public routes, these routes would be restored. Public access to the ROW would be restricted for safety during construction due to safety considerations. For more information on impacts to trails and recreation resources, see Section 3.15, Land Ownership, Management, and Use, and Section 3.16, Recreation.

Following completion of natural gas pipeline construction, a 5-acre site would be developed in the Beluga area to store compressor station materials, pipeline materials, ATVs, and snowmachines to be used for operations and maintenance of the pipeline. As a result of this development, there would be a slight increase in the use of transportation infrastructure, such as public ROWs and roads, which would likely be noticeable in the vicinity of Beluga. However, given the current low levels of use by local Beluga residents, oil and gas operations, and the maintenance and operations of Chugach Electric Association's Beluga power plant, there would be minimal impact to transportation resources.

Under Alternative 2, pipeline decommissioning would include removal of above-ground facilities. Materials that could be salvaged or recycled would be transported to either Anchorage or the mine site where they would be dismantled, salvaged, recycled, and disposed as appropriate. Since all below grade pipe would be abandoned in place, including HDDs, pipeline decommissioning would not involve the construction of new routes (winter or summer) or the creation of additional temporary airstrips.

The direct and indirect effects of Alternative 2 to surface transportation from the construction and operations of the pipeline would be low in intensity, primarily due to the remoteness of the pipeline ROW, low level of use on existing roads in the vicinity of Beluga, and controlled access to the ROW. The effects to surface transportation would be long-term, lasting throughout the life of the pipeline. These effects would generally occur along those portions of the pipeline in the vicinity of Beluga, and therefore, would be local in extent. The affected surface

transportation facilities are neither unique nor protected, and therefore are common in context. No new temporary or permanent public vehicular access is proposed.

Air Transportation

During pipeline construction, personnel and fuel would be transported to construction airstrips on both fixed-wing and rotary (helicopter) aircraft. Nine new airstrips and three existing airports (Beluga, Farewell, and the Donlin Mine Site), would be used (for a listing, see Table 2.3-28 in Chapter 2, Alternatives). The nine new airstrips for pipeline construction purposes would be closed to public access during construction and reclaimed following construction, and therefore, be unavailable for use afterward. The Farewell airport would require an upgrade of its runway surface that would require the runway to be closed during the resurfacing. This closure is anticipated to extend for a 6-month period, but the disturbance to operations would be distributed between both the first and second year winter construction periods depending on the pipeline segment construction phase. During the resurfacing periods, local operations would be temporarily disrupted and planes would have to use adjacent runways or nearby lakes for access.

The improvements to the Farewell Airport would represent a permanent and beneficial impact to the transportation facilities in the region. Existing airports, however, would experience an increase in operations during a single winter or summer season while pipeline construction is occurring. The increase would be noticeable, but would not displace existing operations.

Anticipated frequency of aviation operations during the operations and maintenance phase of the pipeline would consist of approximately 24 helicopter overflights per year and one fixed-wing flight per week from Anchorage to Beluga for security and monitoring purposes. These flights would take off and land at airstrips and lakes currently used by light aircraft. The infrequent pipeline overflights and landings would not impact current air transportation due to existing low levels of flights in the region, nor would the weekly flights from Anchorage.

Anticipated effects to aviation from closure and reclamation activities associated with the pipeline decommissioning and reclamation would consist of a small number of flights to transport personnel for closure and reclamation activities. Similar to operations, these flights would occur near airstrips and lakes currently used by light general aviation aircraft and would have a negligible impact to air transportation in the region.

In summary, the direct and indirect effects to local aviation at existing airports would range in intensity from low to medium during construction, due to the potential for congestion and limited displacement of other uses. Use levels, however, would be low during operations and pipeline closure. Impacts would be temporary and occur primarily during the construction period, but a lower level of air traffic primarily associated with monitoring the pipeline would occur over the life of the project. This would affect local airports where general aviation is a common resource (there are a large number of airports and float/ski plane accessible lakes in the region). Some permanent, beneficial impacts would include improvements to Farewell Airport as air transportation infrastructure in the region.

Water Transportation

During pipeline construction, pipe and other heavy construction materials would be shipped by ocean cargo barge from consolidation terminals in Seattle or Vancouver to the Port of

Anchorage (POA) for temporary storage and deployment to the Beluga barge landing. The POA would experience a temporary increase in shipments. This increase would be slight relative to overall cargo shipments received at the POA, which received an average of 970 receipts per year between 2007 and 2011. During the first two years of construction, 20 barge tows would transport the pipeline materials from the POA to the Beluga barge landing. The resulting traffic into the Beluga Port would increase slightly as a result of pipeline construction. Other materials used for pipeline construction would be barged on the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port (included in the estimated 50 barge tow round trips per year during four years of construction) and in an estimated 20 barge tow round trips to the Kuskokwim Landings, near Devil's Elbow at the point where the pipeline crosses the Kuskokwim River. Transportation effects from barging on the Kuskokwim River were discussed above in Section 3.23.2.2.2, Transportation Facilities.

No effects to water transportation from operations and maintenance of the pipeline are anticipated. No transport via water would occur to support the natural gas pipeline operations and maintenance.

Pipeline decommissioning would include removal of above-ground pipeline facilities. Materials that could be salvaged or recycled would be transported to Anchorage by barge from the Beluga barge landing to the POA where they would be dismantled, salvaged, recycled, and disposed as appropriate. The increase in barge traffic at the Beluga Port and POA as a result of these activities would be minimal relative to other port traffic.

Effects to water transportation from the construction, operations, and decommissioning of the pipeline under Alternative 2 would be of low intensity because the number of barge receipts and barge trips on the Kuskokwim as a direct result of the pipeline would be relatively few. The duration of these impacts would be temporary because effects would only take place during the construction phase and pipeline decommissioning. The extent would be regional, as the impact would be limited to Beluga and the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port site. Since the communities in the area are not served by roads, water transportation is considered an important resource.

Summary of Natural Gas Pipeline Impacts

The overall direct and indirect effects of the construction, operations, and closure of the Donlin Gold natural gas pipeline on existing transportation systems would be of low intensity given the remote location of the ROW, and relatively limited disturbance or displacement from the increase in trips for surface, air, and water transportation. The duration of impacts for transportation would be long-term, extending through the life of the pipeline, but impacts would primarily occur during construction of the pipeline. Improvements to existing airports, however, would be permanent and beneficial and impacts to water transportation would be temporary and occur only during construction and closure phases. Impacts to transportation would be regional in extent because effects would occur in isolated places, including remote airstrips and isolated communities. The context would be considered important because the communities affected rely on water and air transportation resources and are not served by roads.

3.23.2.2.4 CLIMATE CHANGE

The Donlin Gold Project would contribute to climate change through the production of greenhouse gases as discussed in Section 3.8, Air Quality. The amount of greenhouse gas emissions from implementation of Alternative 2 is not likely to create climate change effects to transportation. However, if current climate change trends persist, impacts to transportation would likely be similar to those discussed under the Affected Environment (Section 3.23.1.4), including adverse impacts to winter travel on frozen water bodies and transportation infrastructure degradation from subsidence and riverine erosion caused by melting permafrost.

3.23.2.2.5 SUMMARY OF IMPACTS FOR ALTERNATIVE 2

For the mine site, the summary impact to transportation resources would be negligible. This summary impact is based on direct and indirect impacts to summer and winter trails that pass through or near the mine site. Impacts would be of low intensity (affecting a few intermittent users of many trails in the area) and permanent in duration since the trails would not be replaced during the closure phase. Trails affected by the mine site, in relation to transportation use, are common in context and local in extent as their removal would not greatly alter existing surface transportation or extend beyond the mine site. There is no opportunity for water transportation near the mine site, and therefore no direct and indirect effects to water transportation as a result of the proposed project would occur.

For transportation facilities, the summary impact to transportation resources would be moderate. The predominant impact of Donlin Gold transportation facilities on existing transportation systems would be of medium intensity, due to noticeable, but limited disturbance and displacement of existing uses from increases barge traffic between the Bethel and Angyaruaq (Jungjuk) ports and an increases barge receipts at the Port of Bethel during the summer shipping season. The potential level of strain on infrastructure and displacement of existing uses was offset by the addition of project-associated infrastructure in the Bethel Port facilities and dedicated barge vessels. Direct and indirect impacts to surface, air, and water transportation infrastructure and use levels would be long-term in duration and extend through the life of the mine. Impacts would be regional in extent given that communities along the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port would be affected. For those communities affected, impacts would be considered important in context as they would affect transportation hubs and the Kuskokwim River and occur in an area not served by roads that relies extensively on water and air transportation resources.

For the natural gas pipeline, the summary impact to transportation resources would be minor. The low intensity impact of the pipeline construction, operations, and closure on existing transportation systems (surface, air, and water), due to the limited increase in trips and the remote location of the ROW, are the predominant driver of this summary determination. While the duration of potential impacts would be long-term, extending at low levels through the life of the pipeline, beneficial permanent improvements to existing airports would partially offset direct impacts. Impacts to transportation would be regional in extent because effects would occur in isolated places, including remote airstrips and isolated communities. The context would be considered important because the communities affected rely on water and air transportation resources and are not served by roads (Table 3.23-13).

These effects determinations take into account impact reducing design features (Table 5.2-1 in Chapter 5, Impact Avoidance, Minimization, Mitigation) proposed by Donlin Gold and also the Standard Permit Conditions and Best Management Practices (BMPs) (Section 5.3, Impact Avoidance, Minimization, Mitigation) that would be implemented. Several examples of these are presented below.

Design features most important for reducing impacts to transportation include:

- New, dedicated transportation equipment and infrastructure (such as the new port at Angyaruaq (Jungjuk), the mine site airstrip, and the double-hulled barges) that would minimize impacts to existing regional transportation facilities and activities.
- A communication program to keep local communities informed of the schedules and current status of barge traffic as well as to minimize displacement by barges of subsistence fishing and associated boat travel.
- Natural gas pipeline alternatives to decrease amount of barging to transport diesel fuel and thereby to reduce impacts to other waterborne transportation on the Kuskokwim River. The design decision to use a natural gas pipeline instead of barging 110 Mgal of diesel per year was in response to community concern about barge traffic levels.

Standard Permit Conditions and BMPs important for reducing impacts to regional transportation systems include:

- Developing an Erosion and Sediment Control Plan and Storm Water Pollution Prevention Plans prior to the commencement of ground disturbance activities
- Use of BMPs such as watering and use of dust suppressants to control fugitive dust
- Developing spill prevention and response type plans as required by federal and state requirements. The plan(s) will prescribe effective processes and procedures to prevent the spill of fuel or hazardous substances and include procedures to respond to accidental releases

3.23.2.2.6 ADDITIONAL MITIGATION AND MONITORING FOR ALTERNATIVE 2

The Corps is considering additional mitigation (Table 5.5-1 in Chapter 5, Impact Avoidance, Minimization, and Mitigation) to reduce the effects presented above. Additional mitigation measures include:

- Closure of borrow sites along the mine access road and pipeline, particularly those near communities and major river crossings, would be intended to preclude use of these resources by future users. However, depending on permitter/stakeholder/ landowner interest, consideration should be given to leaving accessible borrow sites open beyond project closure. This may mitigate area wide geologic impacts, through use of existing sites, rather than opening of new sites for borrow materials. A local entity would need to take responsibility for management and ultimate closure of the borrow sites. Per regulation, ADNR may not be able to close use of a borrow site near a community.
- Replace culverts along the mine access road with low water crossings at closure to minimize long-term effects of extreme precipitation events and climate change.

Table 3.23-12: Alternative 2 Impact Levels by Project Component

Project Component	Impact Level				
	Magnitude or Intensity	Duration	Geographic Extent	Context	Summary Impact Rating[1]
Mine Site					
Summary (Surface transportation only)	Low	Permanent	Local	Common	Negligible
Transportation Facilities					
Surface Transportation Facilities	Low	Long-term	Local	Common	
Air Transportation Facilities	Low	Long-term	Regional	Common	
Water Transportation Facilities: Kuskokwim River	*Construction/Operations:* Medium *Closure:* Low	Long-term	Regional	Important	
Water Transportation Facilities: Ports	*Construction/Operations*: Medium *Closure*: Low	Long-term, (upgrade of existing facilities permanent)	Regional	Important	
Summary	Medium	Long-term (upgrade of existing facilities permanent)	Regional	Important	Moderate
Pipeline					
Surface Transportation Facilities	Low	Long-term	Local	Common	
Air Transportation Facilities	*Construction/Operations*: Medium *Closure:* Low	Temporary, except Permanent for upgrade of existing facilities	Local	Common	
Water Transportation Facilities: Ports	Low	Temporary	Regional	Important	
Summary	Low	Long-term except Permanent for upgrade of existing facilities and Temporary for water transport	Local	Important	Minor

Notes:

1 The summary impact rating accounts for impact reducing design features proposed by Donlin Gold and Standard Permit Conditions and BMPs that would be required. It does not account for additional mitigation measures the Corps is considering.

If these mitigation measures were adopted and required, the effects to transportation would be somewhat reduced. Mitigation would decrease geologic impacts to transportation systems, and may improve future access to borrow materials sites. Proposed mitigation would also improve water crossings along the mine access road, which could potentially be used by TKC shareholders after mine closure. However, use of the mine access road upon mine closure is expected to be limited because it would not pass near communities or connect with the existing road system. The intensity rating for surface transportation would remain low for all components, and would not change summary impact ratings.

3.23.2.3 ALTERNATIVE 3A – REDUCED DIESEL BARGING: LNG-POWERED HAUL TRUCKS

Under Alternative 3A, there would be a reduction in diesel storage requirements in Dutch Harbor, Bethel Fuel Terminal, and Angyaruaq (Jungjuk) Port from approximately 40 Mgal to 13.3 Mgal per year relative to Alternative 2 and a 32 percent reduction in total barging activity (Table 3.23-13) during operations. This large reduction in diesel fuel requirements would result in a decrease in fuel shipments from refineries in the Pacific Northwest to Dutch Harbor. As a result, only two round trips per year for fuel would be required under Alternative 3A, rather than seven round trips under Alternative 2, and fuel shipments from Dutch Harbor to Bethel would be reduced to 5 round trips, compared to 14 seasonal round trips under Alternative 2. Correspondingly, fuel shipments by river barge from Bethel to Angyaruaq (Jungjuk) Port would be reduced to 19 round trips per season, compared to 58 round trips for fuel transport under Alternative 2. This reduction in barge traffic only applies to fuel transfers and does not affect barge traffic needed to move cargo to the mine site.

When river barge traffic for both fuel and cargo are taken into consideration, Alternative 3A would result in an estimated 83 annual round trips between Bethel and Angyaruaq (Jungjuk) Port, compared to an estimated 122 annual round trips under Alternative 2, a reduction of 32 percent. This would represent a daily average of 1.5 barge passings, and an average interval of 16 hours between barge passings.

Table 3.23-13: Annual Barge Traffic Comparisons, Alternatives 2 and 3A

	Alt 2	Alt 3	Difference
Cargo	64	64	0%
Fuel	58	19	-67%
Total	122	83	-32%

Under Alternative 3A, the increase in barge traffic relative to baseline would be nearly one third smaller than that of Alternative 2. However, the increase in barge traffic for both ocean and river barges under Alternative 3A, though less than Alternative 2, would still result in noticeable disturbance and limited displacement of other uses at the Bethel port facilities and in narrow reaches of the river, resulting in a rating of medium intensity for transportation facilities.

The extent, duration, and context of these effects would be the same as for Alternative 2.

The direct and indirect effects to surface, air, and water transportation at the mine site from construction, operations, and closure would be the same as Alternative 2. Effects to surface and air transportation facilities from use of LNG-powered haul trucks during operations would be the same as Alternative 2. Effects to surface, air, and water transportation from pipeline construction, operations, and closure would be the same as Alternative 2.

The summary impact for transportation under Alternative 3A would be moderate. Impacts associated with climate change would also be the same as discussed for Alternative 2. The effects determinations take into account applicable impact reducing design features, as discussed in Alternative 2. No additional mitigation measures have been identified to reduce effects to transportation.

3.23.2.4 ALTERNATIVE 3B – REDUCED DIESEL BARGING: DIESEL PIPELINE

Alternative 3B would substitute a diesel pipeline for the natural gas pipeline, reducing barging on the Kuskokwim River by 48 percent and requiring an additional 19-mile pipeline segment to access a new diesel fuel dock on the west side of Cook Inlet. The mine site impacts are identical to those of Alternative 2. The extent, duration, and context of all impacts would be the same as for Alternative 2. Impacts associated with climate change would also be the same as discussed for Alternative 2. The discussion under this alternative focuses on differences in intensity of impacts to the transportation facilities and pipeline components under Alternative 3B. The effects determinations take into account applicable impact reducing design features, as discussed in Alternative 2. No additional mitigation measures have been identified to reduce effects to transportation.

3.23.2.4.1 TRANSPORTATION FACILITIES

Effects to surface and air transportation from the diesel pipeline during construction and operations of the proposed Donlin Gold Project would be the same as discussed for the natural gas pipeline in Alternative 2.

Under Alternative 3B, diesel fuel would be shipped via ocean barge to Tyonek, where the diesel pipeline would begin, and cargo would be transported to the mine site along the Kuskokwim River via river barge. Consequently, diesel storage requirements in Dutch Harbor, Bethel Fuel Terminal, and Angyaruaq (Jungjuk) Port would be substantially decreased relative to Alternative 2, a reduction of approximately 27.5 Mgal annually; 10 Mgal of onsite diesel storage would be required. In addition, most of the fuel shipment requirements proposed under Alternative 2 would be eliminated, including 7 annual ocean barge fuel shipments to Dutch Harbor, 14 annual ocean barge fuel trips from Dutch Harbor to Bethel, and 58 annual river barge fuel trips from Bethel to Angyaruaq (Jungjuk) Port (Table 3.23-14). These trips were required to ship diesel fuel to the mine site for operation of the mine. Construction of the Angyaruaq (Jungjuk) Port, access road, and mine site would require shipping some quantity of diesel fuel to Angyaruaq (Jungjuk) Port. As shown in Table 3.23-14, the 15 fuel shipments by barge during construction would be the same as discussed for Alternative 2. Cargo would continue to be transported to the mine site by ocean barge (12 annual round trips to Bethel) and river barge (64 annual round trips from Bethel to Angyaruaq (Jungjuk) Port). Alternative 3B, however, would reduce peak annual barge traffic on the Kuskokwim River to an estimated 64 additional round trips per season; a reduction of 48 percent from an estimated 122 additional

round trips per season proposed in Alternative 2. This would represent a daily average of 1.2 barge passings and an average interval of 21 hours between barge passings.

Table 3.23-14: Annual Barge Traffic Comparisons, Alternatives 2 and 3B

	Alt 2		Alt 3B		Difference	
	Const.	Ops.	Const.	Ops.	Const.	Ops.
Cargo	50	64	50	64	0%	0%
Fuel	15	58	15	0	0%	-100%
Total	65	122	65	64	0%	-48%

Under Alternative 3B, the increase in barge traffic on the river relative to the existing baseline river barge traffic would be about 48 percent smaller than that under Alternative 2. However, when considered in relation to Alternative 2, the potential for disturbance and displacement from the smaller increase in barge traffic for both ocean and river barges under Alternative 3B would result in a rating of low intensity to transportation facilities. The lower volume of increased traffic would result in less disturbance (i.e., impact to boater safety) and reduced displacement of existing patterns of river traffic relative to Alternative 2.

The summary impact for transportation facilities under Alternative 3A would be minor.

3.23.2.4.2 DIESEL PIPELINE

Effects to transportation from pipeline construction and closure would be similar to Alternative 2. However, portions of the temporary gravel access roads developed during construction would be left in place after construction to provide increased diesel spill response capabilities. This alternative would require additional airstrips and staging areas for pipeline construction, and most of the airstrips would need to be left in place throughout the operating life of the pipeline for diesel spill response capacity. Table 2.3-36 (Chapter 2, Alternatives) shows airstrips for Alternative 3B.

Alternative 3B would also require additional cargo and fuel shipments to Tyonek Forelands terminal for construction of the fuel terminal and additional pipeline segment from Tyonek to Beluga. Additional cargo barge trips from Anchorage would also be required to transport construction materials during pipeline construction. These additional barge trips are expected to have a minimal impact on transportation resources.

During pipeline operations, two fuel tankers per month would berth at the terminal facility, for a total of 24 barge trips per year. On average, 100 tanker barge trips move in and out of Cook Inlet annually to meet current demand (Cape International 2012). Twenty-four additional trips under Alternative 3B represent an increase of nearly 25 percent to existing Cook Inlet tanker traffic. Impacts to water transportation in Cook Inlet would be low intensity since the function of marine transport would not change or exceed capacity. The duration would be long-term and extend through the life of the project. The context would be common because marine transportation is typical in the area and Cook Inlet has capacity to accommodate additional demand. The extent is local, as it is limited geographically to the Cook Inlet which regularly

serves tanker traffic. The summary impact for the pipeline under Alternative 3A would be minor.

Impacts to surface and air transportation under the operations phase of Alternative 3B would be similar to Alternative 2, as the airstrips and shoofly roads left in place during operations of the mine would still generate low intensity levels of use, as discussed in Section 3.16.3.4, Recreation. The surface transportation facilities would be located in remote locations without connectivity to population centers.

3.23.2.5 ALTERNATIVE 4 – BIRCH TREE CROSSING (BTC) PORT

This alternative would substitute the BTC location for the upriver port, resulting in a 38 percent reduction of barging distance. The BTC Port itself would be approximately the same design as that proposed for Angyaruaq (Jungjuk) with the exception that the BTC Port would be 62 acres in size and the Angyaruaq (Jungjuk) Port would be 21 acres in size due to terrain and logistics of using the road. The BTC mine access road would be 153 percent longer (76 miles under Alternative 4 as compared to 30 miles under Alternative 2). This would be a difference of 46 miles, which is an incremental addition 153 percent larger than the 30 mile baseline for Alternative 2. Impacts to transportation from the mine site and pipeline components would be the same as under Alternative 2. The extent, duration, and context of all impacts would be the same as for Alternative 2. Impacts associated with climate change would also be the same as discussed for Alternative 2. The discussion under this alternative focuses on differences in intensity of impacts to the transportation facilities under Alternative 4. The effects determinations take into account applicable impact reducing design features, as discussed in Alternative 2. No additional mitigation measures have been identified to reduce effects to transportation.

3.23.2.5.1 TRANSPORTATION FACILITIES

Under Alternative 4, effects to air transportation facilities would be the same as Alternative 2. For surface transportation, construction of a temporary winter access road from Crooked Creek to the vicinity of the mine site to access material sites for road construction could encourage public access from Crooked Creek during the first winter of construction. Following construction, however, the temporary access road would be reclaimed to limit future surface transportation during operations. Aside from this localized and brief change in access during construction, the impacts to surface transportation would be the same as Alternative 2. Alternative 4 would also require a road from the BTC Port site to the mine site that would be 2.5 times longer than the road from the Angyaruaq (Jungjuk) Port to the mine site (76 miles versus 30 miles). The impacts to surface transportation would be the same as Alternative 2 since the road would not be accessible from communities in the vicinity or open to the public.

Development of the BTC Port and the extension of the road to the BTC Port site under Alternative 4 would reduce effects on water transportation, relative to Alternative 2, by eliminating project barge traffic upriver of the BTC. The barging distance from Bethel to the BTC would be approximately 124 river miles, a reduction of 75 river miles from Alternative 2 (which would be 199 river miles from Bethel to the Angyaruaq [Jungjuk] Port site), a reduction of 38 percent (see Table 3.23-15). The reduced barging distance would result in shorter round trip barge transportation times from Bethel to the BTC Port, yet the same number of tows

(consisting of two fuel and two cargo barges) would be required as proposed in Alternative 2 since the amount of cargo and fuel, and hence the barge loads, would remain the same. While the number of trips would remain the same, these trips would be completed more quickly and result in fewer days of traffic during the shipping season. An important additional difference is that the Kuskokwim River narrows above BTC. With the upriver port at BTC, the communities of Aniak, Chuathbaluk, and Napaimute would not see impacts from barging associated with the proposed project.

Table 3.23-15: Annual Transportation Distances Comparisons, Alternatives 2 and 4

	Alt 2 – Miles	Alt 4 – Miles	Difference in Miles	Difference in %
Barge	199	124	-75	-38%
Mine Access Road	30	76	46	153%

Alternative 4 would have fewer days of traffic than Alternative 2, but would remain a large increase in traffic relative to the baseline conditions, but disturbance and displacement of other uses would be reduced to low intensity. The duration of these impacts would last the life of the project and are considered long-term. The effects would be regional in extent since the communities of the lower Kuskokwim River would be affected. Water transportation is an important resource to the communities in this area not served by roads. The summary impact for transportation facilities under Alternative 3A would be minor.

3.23.2.6 ALTERNATIVE 5A – DRY STACK TAILINGS

Alternative 5A would use the dry stack tailings method instead of the subaqueous tailings storage method that would be used under Alternative 2. This method would not change the effects to surface, air, or water transportation from mine site construction, operations, maintenance, and closure; effects would be the same as Alternative 2. Alternative 5A would result in an increased demand for diesel and consumables, which would place increased demand on the barge supply chain. However, the increase would be minimal relative to the amount of barge traffic proposed. Therefore, effects to surface, air, and water transportation from mine site construction, operations, maintenance, and closure would be the same as Alternative 2. Effects to surface, air, and water transportation from mine site construction, operations, and closure would be the same as Alternative 2. The summary effect of Alternative 5A on transportation systems, from all project components would be moderate, the same as Alternative 2. Impacts associated with climate change would also be the same as discussed for Alternative 2. The effects determinations take into account applicable impact reducing design features, as discussed in Alternative 2. No additional mitigation measures have been identified to reduce effects to transportation.

3.23.2.7 ALTERNATIVE 6A – MODIFIED NATURAL GAS PIPELINE ALIGNMENT: DALZELL GORGE ROUTE

Alternative 6A would realign the natural gas pipeline between MP 106.5 and MP 152.7 to the west of the proposed route in Alternative 2, and would traverse Dalzell Gorge. For the mine

site, the potential direct and indirect impacts to transportation resources during construction, operations, and closure under Alternative 6A would be the same as those described under Alternative 2. The extent, duration, and context of all impacts would be the same as for Alternative 2. The discussion under this alternative focuses on differences in the transportation facilities and pipeline under Alternative 6A.

For the transportation facilities component, under Alternative 6A, two new airstrips would be built at Pass Creek and Tatina. These would likely be reclaimed after construction and would have no lasting impacts to transportation in the region. Therefore, effects to surface, air, and water transportation from mine site construction, operations, and closure would be the same as Alternative 2.

For the pipeline component, approximately 42.9 miles of this route would be located in the vicinity of the Iditarod National Historic Trail, over three times the miles affected under Alternative 2 (13.1 miles). Section 3.16, Recreation, discusses how this would affect use of the trails in the area. This alignment would not change the effects to surface, air, or water transportation from mine site construction, operations, and closure. Effects would be the same as Alternative 2.

The summary effect of Alternative 6A on transportation systems from all project components would be moderate, the same as Alternative 2. Impacts associated with climate change would also be the same as discussed for Alternative 2. The effects determinations take into account applicable impact reducing design features, as discussed in Alternative 2. No additional mitigation measures have been identified to reduce effects to transportation.

3.23.2.8 COMPARISON OF IMPACTS – ALL ALTERNATIVES

A comparison of the impacts to transportation by alternative is presented in Table 3.23-16.

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Table 3.23-16: Comparison of Impacts by Alternative*

Impact-causing Project Component	Alt. 2 – Proposed Action	Alt. 3A – LNG-Powered Haul Trucks	Alt. 3B – Diesel Pipeline	Alt. 4 – BTC Port	Alt. 5A – Dry Stack Tailings	Alt. 6A – Dalzell Gorge Route
Mine site facilities	Primitive trails affected – 9 miles	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Transportation facilities	**Surface Transportation** Road constructed – 30 miles **Water Transportation** Marine barges (cargo) to Bethel per season · 16 barges (construction) · 12 barges (operations) Marine barges (fuel) to Bethel per season · 4 barges (construction) · 14 barges (operations) Marine barges (fuel) to Dutch Harbor per season · 4 barges (construction) · 7 barges (operations) Kuskokwim River barging distance – 199 miles River barges (cargo) from Bethel to Angyaruaq (Jungjuk) Port site per season · 50 barges (construction) · 64 barges (operations) River barges (fuel) from Bethel to Angyaruaq (Jungjuk) Port site per season · 15 barges (construction) · 58 barges (operations) **Air Transportation** *Construction:* Annual Operations at Mine Airstrip of Fixed Wing Aircraft: 5,148 *Operations and Maintenance:* Annual Operations at Mine Airstrip of Fixed Wing Aircraft: 1,716	**Surface Transportation** Same as Alternative 2 **Water Transportation** Marine barges (cargo) to Bethel per season · Same as Alternative 2 Marine barges (fuel) to Bethel per season · 4 barges (construction) · 5 barges (operations) Marine barges (fuel) to Dutch Harbor per season · 4 barges (construction) · 2 barges (operations) River barges (cargo) from Bethel to Angyaruaq (Jungjuk) Port site per season · Same as Alternative 2 River barges (fuel) from Bethel to Angyaruaq (Jungjuk) Port site per season · 15 barges (construction) · 19 barges (operations) **Air Transportation** Same as Alternative 2	**Surface Transportation** Same as Alternative 2 **Water Transportation** Marine barges (cargo) to Bethel per season · Same as Alternative 2 Marine barges (fuel) to Bethel per season · 4 barges (construction) · 0 barges (operations) Marine barges (fuel) to Dutch Harbor per season · 4 barges (construction) · 0 barges (operations River barges (cargo) from Bethel to Angyaruaq (Jungjuk) Port site per season · Same as Alternative 2 River barges (fuel) from Bethel to Angyaruaq (Jungjuk) Port site per season · 15 barges (construction) · 0 barges (operations) **Air Transportation** Same as Alternative 2	**Surface Transportation** Road constructed – 76 miles **Water Transportation** Marine barges (cargo) to Bethel per season · Same as Alternative 2 Marine barges · Same as Alternative 2 River barges · Same as Alternative 2 Kuskokwim River barging distance – 124 miles **Air Transportation** Same as Alternative 2	Same as Alternative 2	Same as Alternative 2, except for the addition of two new airstrips proposed for construction at Pass Creek and Tatina.

Table 3.23-16: Comparison of Impacts by Alternative*

Impact-causing Project Component	Alt. 2 – Proposed Action	Alt. 3A – LNG-Powered Haul Trucks	Alt. 3B – Diesel Pipeline	Alt. 4 – BTC Port	Alt. 5A – Dry Stack Tailings	Alt. 6A – Dalzell Gorge Route
Pipeline facilities	**Surface Transportation** Winter access routes – 58 miles **Water Transportation** Bethel Port barge increases: · Construction: 10 · Operations: 26 · Closure: Negligible **Air Transportation** Existing airports to be upgraded - 3 airports · 300% operations increase at Rainy Pass · 20% operations increase at Skwentna Temporary airstrips to be constructed – 9 Helicopter overflights per year – 24 flights (operations)	Same as Alternative 2	**Water Transportation** Marine barge (fuel) trips per year in the Cook Inlet - 24 **Air Transportation** Same as Alternative 2, except for the addition of three new proposed airstrips; Puntilla, Tatlawiksuk, and George River airstrips.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Impact Summaries						
Mine Site	The summary impact would be negligible. Intensity is low overall as only a few intermittent users would be affected by the removal of trails at mine site. Duration of effects would be permanent since the trails would not be replaced after mine closure. Effects are local in extent and limited to the mine site. Trails affected are common in context.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Transportation Facilties	The summary impact would be moderate. The predominant impact would be medium intensity impacts from an increase in barge traffic between the Bethel and Angyaruaq (Jungjuk) ports, and an increase in barge receipts at the Port of Bethel. Duration of effects would be long-term and extend throughout the life of the mine. Effects are regional in extent as communities along the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port would be affected. The context would be important as effects would occur in areas not served by roads that rely extensively on water and air transportation resources.	The summary impact would be moderate. Intensity would remain medium despite the reduction in barge trips due to a large increase in barge traffic relative the existing baseline conditions. Other effects would remain the same as Alternative 2.	The summary impact would be minor. Intensity would be low due to smaller increase in barge traffic. Other effects would remain the same as Alternative 2.	The summary impact would be minor. The 46 mile longer mine access road would be a low intensity impacts to surface transportation, same as Alternative 2, It adds dedicated capacity, with minimal disturbance to existing sues. For barge transportation, intensity would be low due to reduced disturbance and displacement of other uses, relative to Alternative 2.. Other effects would remain the same as Alternative 2.	Same as Alternative 2	Same as Alternative 2
Pipeline	The summary impact would be minor. Intensity is low overall due the limited increase in trips and the remote location of the ROW. Duration of effects would be long-term and extend through the life of the pipeline, except for beneficial permanent improvements to existing airports. Effects would be regional in extent since effects would occur throughout the study area. The context would be considered important as the communities affected rely on water and air transportation resources and are not served by roads.	Same as Alternative 2	The summary impact would be minor. Impacts to water transportation in Cook Inlet would be low intensity since the new marine transport would not change or exceed capacity. Other effects would remain the same as Alternative 2.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2

Note:

* The No Action Alternative is presumed to have no impacts.